UNIVERSITY OF WYOMING | Extension

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Brome Seed Midge
(Stenodiplosis bromicola)

A pest of smooth bromegrass seed production

Smooth bromegrass (*Bromus inermis*) is an important non-native forage grass important for pasture grass and sometimes used in restoration. Unfortunately, when smooth bromegrass was brought to North America from Europe in the late 1800s the brome seed midge (BSM) and the parasitoid wasp that attacks it came too. The reduction of yield of smooth bromegrass seed caused by BSM makes producing it uneconomical without an integrated pest management plan for the insect.

The parasitoid wasp, *Tetrastichus bromi*, attacks the BSM maggots after the damage to the developing seed is already done. Despite parasitism rates of up to 75 percent observed in smooth bromegrass fields, enough of the BSM larvae survive to be damaging to seed production. BSM produces multiple generations, at least two every season, during the relatively short time between the heading and flowering of smooth bromegrass.

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Fig. 1 The larger insect on the bottom is an adult female brome seed midge, *Stenodiplosis bromicola*, with her needle-like egg laying ovipositor fully extended behind her. The shorter black bars on the ruler are 1 mm in length. Above the midge's ovipositor is her enemy, a parasitoid wasp, *Tetrastichus bromi*, whose larvae will feed on the midge's maggots after the developing bromegrass seed has already been destroyed. In seed fields, the parasitoid attack does not reduce the seed yield losses caused by the BSM to below economically damaging levels (S. P. Schell photo).

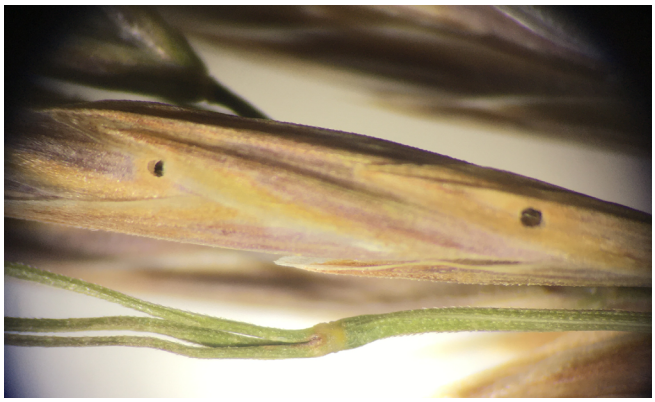

Fig. 2 Exit holes made by the adult parasitoid wasp, *Tetrastichus bromi*. The maggots of the bromegrass seed midge have already destroyed the smooth bromegrass seeds in this floret. The larvae of the parasitoid wasp consumed the brome grass seed midge maggots. The parasitoid wasp larvae turned into adult wasps inside the floret, chewed a round exit hole, and emerged. The insect activity caused the damaged seed head to develop a distinctive color that differs from undamaged seed heads (S.P. Schell photo).

General description of brome seed midge adults, eggs, maggots, and pupae

- Adult BSM are 1.5 to 2mm* long (including the female's long needle-like ovipositor) with short thread-like antennae arising from a dark head with no visible mouth parts.
- They are a true fly (Order Diptera) with only two lightly veined wings, a dark grey thorax, and pale-yellow abdomen.
- Eggs are 0.5mm by 0.1 mm and are inserted into the grass's floret.
- BSM maggots are bright yellow, without a head capsule and grow to a length of 1.5 to 2mm when fully developed. This occurs after six to nine days, depending on the ambient temperature.
- BSM pupae head and thorax are dark, while the abdomen maintains the yellow color.

BSM Lifecycle

- Emergence of the overwintering generation of BSM adults from the leaf litter peaks when the smooth bromegrass starts heading.
- The female BSM emerge, mate and deposit 80 to 100 eggs. This is the summer generation that develop in the bromegrass seed heads.
- The maggots grow rapidly and adult midge emergence peaks when the bromegrass starts flowering.
- The BSM produces at least two generation per year. However, in some studies, the BSM produced four generations when climate conditions prolonged the plant host's seed development.
- The first-generation maggot moves to the tip of the floret it developed in, fastens itself there, pupates and matures into the adult midge in two to three days.

*1mm equals ~0.04 of an inch

- Once the later generations of BSM maggots start to feed on fertilized ovaries or developing seeds of the smooth bromegrass floret, the larva enters a resting state known as diapause.

- Most of the diapausing larvae fall into the leaf litter below the plants attached to the seed they destroyed. They will stay in the larval stage in the leaf litter until the following spring when they pupate and emerge as their host plant starts producing seed heads again.

- Overwintering larvae in the leaf litter are vulnerable to crop residue burning.

Crop damage symptoms

- There is no visible sign of BSM in the smooth bromegrass seed crop initially, unless the pupal case of the first generation can be found still attached to the tip of the floret it fed upon.

- The feeding damage of the second generation BSM causes a color change in the ripening seed heads. The exit holes created by the parasitic wasp may be visible (Fig. 2).

BSM Population Monitoring

- Sweep net sampling when the smooth bromegrass plants start to head out is currently the best way to detect the presence of the pest in the field. Sample the crop when the leaves are not wet with rain or dew and the wind is calm as the BSM are not strong fliers.

Integrated Pest Management Tactics

- Burning smooth bromegrass crop residue can destroy many of the diapausing BSM maggots in the leaf litter and reduce pest pressure when the crop resumes growth the next year. The potential for damage to the smooth bromegrass plants is minimized if the crop residue is burnt in mid-winter.

- The threshold for economic damage is very low because BSM is extremely prolific with multiple generations that can result in complete crop loss of very high value seed crop.

Chemical Control

- Pyrethroid and organophosphate insecticides labeled for the co-occurring grass seed pests such as leafhoppers, are suitable for BSM. Consult with your seed crop advisor for current recommendations, as many of these insecticides only have 24C registration for grass seed crops which could end on short notice.

- Two applications of insecticide will be necessary. The first application should be timed to coincide with the appearance of seed heads to reduce the overwintering generation of BSM adults. The second application should be applied when the bromegrass starts flowering to control the within-field summer generation of BSM adults and adults migrating from nearby hayfields.

- Because the BSM midge is prolific and produces multiple generations in a growing season, it is important to take steps to prevent insecticide resistance, such as alternating insecticide modes of action or applying tank mixes of insecticides with two modes of action are known to be effective. To learn more about preventing insecticide resistance visit: https://irac-online.org/.

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